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Tax Incentives under Sanctions: Evidence from Russian Tax Authorities

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Abstract

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Keywords: Russian; sanctions; tax incentives

JEL Classification: F51; H25; H71

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Tax Incentives under Sanctions: Evidence from Russian Tax Authorities*

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We examine how having access to tax incentives can act as a novel channel through which firms can alleviate the effects of economic sanctions. By leveraging the universe of more than eight million unique Russian firm-year observations from 2000 to 2023, we first construct a novel measure of unexpected firm-level tax incentives orthogonal to firm fundamentals and other predictable incentives. Using such a measure, we show that firms receiving tax incentives the year prior to the sanctions imposed on Russia in 2014 exhibit higher capital investments and returns on assets than firms without such incentives. These improved outcomes are shown to be linked to the corresponding increases in both revenue and profits and a decrease in their overall labor costs ex-post. Such results are qualitatively consistent with a stylized New-Keynesian model where firms are able to leverage unexpected tax incentives to offset production costs.

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[...] in this world nothing can be said to be certain, except death and taxes.

- Benjamin Franklin

1 Introduction

While nothing could be more certain than having to pay taxes, the extent to which one can receive a reprieve, broadly defined, from doing so is akin to having access to additional resources that allow for a better economic outcome. Such incentives are especially important during periods of significant constraints and austerity. In this paper, we consider how having access to tax incentives can act as a novel channel through which firms can alleviate the constraints under economic sanctions.

Indeed, recent increases in economic sanctions have inspired a large and growing literature focusing on their effects on firm-level outcomes (Felbermayr et al., 2020; Caldara and Iacoviello, 2022). While sanctions are documented to be largely ineffective (Ahn and Ludema, 2020), the exact channels through which firms in sanctions countries can alleviate their effects are unclear (Gaur et al., 2023; Duong et al., 2024). At the same time, another large literature has documented that tax incentives (broadly defined) can be generally effective in improving firms' outcomes (Yang et al., 2012; Prillaman and Meier, 2014; Ohrn, 2019; Eichfelder et al., 2023a). For the most part, these two strands of the literature have lived separate but parallel lives. At the intersections of these two strands of the literature, we examine the extent to which tax incentives help alleviate the potential negative impacts of sanctions on firms' fundamentals.

By leveraging the universe of detailed firm-level Russian tax data by different tax authorities from 2000 to 2023, we contribute to these strands of the literature by considering unexpected tax incentives as a novel channel through which firms can alleviate the impacts of sanctions. Specifically, our main source of novelty hinges on our construction of an ex-ante tax incentive measure that is orthogonal to both firm-level fundamentals and other pre-determined tax incentive mandates. We then leverage such a constructed measure and show that firms receiving tax incentives before the sanctions imposed on Russia in 2014 exhibit higher capital investments and returns on assets than

firms without such incentives *ex-ante*. We then show that such improved firms' outcomes are driven by the corresponding increases in both revenue and profits and a decrease in their overall labor costs ex-post.

To guide the intuition behind the firm-level response to unexpected tax incentives, we incorporate such incentives a là Greenwood and Huffman (1991) into an otherwise standard New-Keynesian model with capital in the spirit of Fernández-Villaverde and Rubio-Ramírez (2006, 2007) and Andreasen et al. (2017). The key model implications are disciplined by a continuum of intermediate goods producers, each subject to an exogenous tax incentive shock that allows them to offset some operating costs. Our exposition is motivated by how the Russian tax authority provides a reduction in the tax burden in the form of decreased required social contribution and other operating costs.[1] In response to an unexpected positive tax incentive, the model predicts overall increases in capital investments and returns on assets. Such increases are driven by rises in profits and revenues and an overall fall in the firms' marginal costs.

To test whether tax incentives can indeed help Russian firms better weather the potential impact of the sanctions imposed on Russia in 2014, we next leverage the universe of tax filings from Russian firms to various Russian tax authorities from 2000 to 2023. Data is available at the firm level, consisting of a detailed record of how much tax each firm paid, along with various measures that capture firm fundamentals.

Our starting point is to construct a firm-level tax incentive measure that allows us to capture the exogenous tax incentive the firm received in 2013 - the year prior to implementing various sanctions on Russia in 2014 (Felbermayr et al., 2020). We do so using a two-step approach. In the first step, we leverage data until 2013 and construct a measure of firm-level *predicted* corporate income tax rate for each year based on various firm fundamentals and characteristics. We then compute the difference between the *actual* tax rate that the firm had to pay and the predicted counterpart for the average firm in the same sector in 2013. If such a difference is positive, we

[1] See, for example, Table 1, for a summary of recent Russian tax incentives.

assign the firm to the group that received tax incentives in 2013 and otherwise.

Intuitively, by controlling for firm-level characteristics ex-ante, we can account for the *expected* tax incentives that firms could have received in 2013. For example, Russian firms can receive investment tax deductions, tax relief based on their Special Purpose Investment Contract (SPIC), or on their R&D activities, all of which are dependent on firm fundamentals. By classifying whether a firm received any tax incentive based on its actual tax rate relative to the predicted sector averages, we aim to isolate the effects of sector-specific tax incentives, which are largely predictable from one year to another. For example, as noted in Table 1, Russian firms in specific sectors (e.g., information technology or oil) can receive unique tax treatments.

The impetus behind our meticulous treatment of the tax incentive measure allows us to single out the predictable component of the tax incentive ex-ante. What is left from the procedure is a measure that largely captures the *unexpected* tax incentive the firm received in 2013. Since firms are legally required to pay tax net of any deduction due to variations in firm-level characteristics and *ex-ante* sector-based incentive provisions, the cross-sectional variation in our constructed measure of firm-level incentive is thus attributable to *unpredictable* changes in tax incentive structure that the government imposes in the year right before the sanction.

Using the constructed unexpected tax incentives, we document that, following the 2014 sanction on Russia, Russian firms that received such incentives in 2013 are able to increase their capital expenditure and have higher returns to assets relative to firms without such incentives. We then show that such outcomes are driven by a rise in firms' revenue and a fall in labor costs. These results dovetail with the prediction from the stylized model where we incorporate tax incentives into an otherwise standard New-Keynesian model with capital. We also find that the benchmark effects on capital expenditure and returns on assets are particularly strong on non-state-owned enterprises (non-SOE) while being not significant among their state-owned counterparts. Furthermore, we also found that the effect varies across different industries. To our surprise, the military industry shows improved investment following tax incentives; however, these companies do not exhibit better

financial performance.

Our results are robust to a variety of robustness checks. First, we find that our timing of both the sanctions and the tax incentives is non-arbitrary: our empirical results no longer hold when we randomize the tax treatment and assign sanctions to happen the year before. Second, our results are consistent across different clustering methods for standard errors. Third, we leverage the synthetic difference-in-difference estimator a là Arkhangelsky et al. (2021) and find that the estimated average treatment effects are largely consistent with our benchmark regression.

Our paper proceeds as follows. Section 2 provides background on the Russian tax incentive structure and an overview of the related literature on sanctions and their spillover effects. Section 3 describes a stylized model, along with our testable hypotheses. Section 4 describes our empirical approach, detailing how to construct the exogenous tax incentive measure. Section 6 documents our main results and discusses the potential mechanisms behind such results. Section 7 presents robustness checks on our main results. We conclude in Section 8.

2 Background and Literature review

2.1 Russian Tax Incentives

When discussing the effects of taxation during sanctions, several studies have explored the economic rationale behind the design of sanction tools as a form of trade taxation (Becko, 2024). However, this section focuses on how tax incentives should be structured to support Russian business activities. Yakovlev (2001) examines how Russian companies evade taxes through undeclared cash transactions ("black cash"). Two main mechanisms are identified: traditional under-reporting and more sophisticated encashment schemes involving unregistered firms. The study also finds that such practices can significantly reduce operating costs and increase profits. However, the Russian tax system is complicated and has different rationales. The standard profit tax rate in Russia is 20% (split between federal and regional shares), but different regional authorities allow much lower rates

(Korsunskaya, 2024). For example, under Regional Investment Projects (RIPs) in certain areas, eligible new projects can enjoy a 0% federal profit tax and a reduced regional tax (often around 10%) for a set period. (St. Petersburg Investment Portal, 2024).

In 2022, amid the consequences of sanctions, the government even granted all IT companies a three-year profit tax exemption as an emergency measure (Reuters, 2022). Furthermore, according to the Decree of the Russian Federation Government dated 16 July 2016 (No. 708), there are Special Investment Contracts (SPICs), individualized agreements for major projects, that can also fix a profit tax at 0% regionally for up to 10–20 years to support high-tech industrial investments (World Trade Organization, 2016). Furthermore, Russia Federal offers generous R&D tax incentives, including a 150% super deduction on eligible expenses, reduced social security contributions, and VAT exemptions (Deloitte LLP, 2016). Between 2005 and 2015, Russia established six successful techno-innovative SEZs and the Skolkovo Innovation Centre, which together attracted hundreds of firms, created more than 14,000 jobs, and promoted high-tech development alongside sustainability initiatives, with additional benefits such as a potential 0% profit tax for companies operating in these zones (UN Trade and Development, 2019). The main incentive for implementing this tax policy in the IT and innovation sectors is to enhance these firms' profitability and global competitiveness despite sanctions restricting access to certain technologies.

The literature attempts to see how Russian oil and energy companies do business during sanctions (Huynh et al., 2025). Although Russia's oil and gas giants are heavily taxed, certain resource development projects have benefited from tax incentives to stimulate regional growth. Russia's oil tax maneuver supports oil companies by phasing out export duties and increasing the mineral extraction tax (MET), boosting investment efficiency and net profits while maintaining the (regional) state budget. Companies such as Irkutsk Oil Company (INK) and Rosneft benefit from this shift, with added flexibility through excess profit tax options for certain projects (Deloitte LLP, 2020a; Plyaskina, 2022). In 2020, the Russian government introduced Investment Protection and Promotion Agreements (IPPAs), which allow a change from subsidies to tax deduction mechanisms,

reducing the tax base or partially refunding previously paid taxes as permitted by law (Association of European Businesses, 2019). In which firms can receive a deduction of up to 90% (regional) and 10% (federal) tax based on capital expenditure (Deloitte LLP, 2020b).

Several regions host SEZs or similar regimes, thus seeing a high concentration of tax-benefited firms. Firms in Russia's SEZs enjoy full exemptions from property and land taxes, along with a reduced income tax rate of 2% federally and 0%–13.5% regionally. For example, Tatarstan (with the Alabuga SEZ) has attracted major manufacturing plants under generous tax-free terms (Ministry of Economy of the Republic of Tatarstan, 2022). The Kaluga region used its "industrial parks" and a Regional Investment Projects regime to attract many factories with profit tax cuts. A special zone granting new investors at least 5 years of 0% profit tax and subsequent years at half the standard rate, plus exemption from customs duties – a crucial incentive to compensate for the geographical isolation of the region (Kaluga region, 2022).

[Table 1 here]

In summary, the Russian Federation offers a range of tax incentives through reductions at both the regional and federal levels. Table 1 summarizes the key features of tax incentives in Russia. Certain sectors, such as IT, benefit from more generous support, including exemptions from land and customs taxes. Meanwhile, reforms such as shifting the tax burden from exports to mineral extraction further enhance business profitability and revenue growth.

2.2 The impacts of tax incentives on firms

Our paper is related to the area of examining how firm financial performance responds to tax changes. In this section, we provide a brief overview of the literature, highlighting the most recent studies that are most relevant to our research.

Taxes have been shown to reduce innovation (Mukherjee et al., 2017). But what about tax cuts? The US multinationals did not show significant real investment responses and retained a large portion of their liquidity as cash following the 2018 Tax Cuts and Jobs Act, regardless of

financial constraints (Albertus et al., 2022), which aligns with previous findings. The existing literature primarily evaluates the effects of tax changes in the context of active government reforms, for example, the transitions of the United Kingdom and Japan from worldwide to territorial tax systems (Arena and Kutner, 2015; Liu, 2020). In contrast, our study differs by examining the role of existing tax systems that offer specific incentives or relief to help firms mitigate the negative impacts of sanctions. A new Keynesian model shows that tax-based investment incentives have substantial macro-to-micro effects (Edge and Rudd, 2011). For example, bonus depreciation tax incentives increase investment quantity, they significantly reduce investment quality (Eichfelder et al., 2023b). In contrast, tax incentives do not significantly increase capital investment, contrary to neoclassical theory, because the benefits are partially offset by higher capital prices, a phenomenon known as tax shifting or implicit taxes (Davis and Swenson, 1993). In another approach, Guceri and Albinowski (2021) employ a natural experiment in Poland where two similar investment tax incentives were implemented during periods of low and high economic uncertainty, revealing that while tax incentives increase investment during stable times, their effectiveness decreases under high uncertainty due to heterogeneous firm responses. Kemsley (1998) shows that tax incentives, particularly those arising from binding foreign tax credit limitations, lead US multinationals to favour exports over foreign production when choosing foreign markets. Furthermore, Klassen et al. (2004) found that both the US and Canadian tax incentive systems increase R&D spending, but the US system induces a larger increase. The empirical evidence extends by examining the multinational tax incentives and corporate choices of offshore jobs (Williams, 2018). Although tax incentives could be beneficial for firms, they are more likely to consider 'tax incentive' as uncertainty. Therefore, firms are more likely to hedge in response to tax incentives (Graham and Rogers, 2002). In this strand of literature, the effect of tax incentive is different with firm types and managerial style. Financial reporting myopia can weaken the effectiveness of tax incentives for innovation, leading affected companies to reduce investment and innovative output in response to changes in accounting standards (Williams and Williams, 2021).

In summary, the existing literature examines how firms respond to tax incentives in various

contexts. This study contributes to the literature by introducing a novel approach to measure unexpected tax incentives that are orthogonal to firm fundamentals and other predictable factors. In addition, we find that firms receiving tax incentives after the first sanction episode in 2014 are more likely to respond positively to the shocks. Furthermore, our analysis highlights the mechanisms - based on a New Keynesian framework - through which tax incentives under sanctions can support these positive responses.

2.3 Targeted Sanctions and Spillover Effects

The existing literature examines the direct effects of sanctions on targeted entities, such as individuals, firms, and other organizations, which are relevant to Russia after the event of 2014. Drawing on the Global Sanctions Database by Felbermayr et al. (2020), Morgan et al. (2023) also highlighted a current pattern of sanctions used. In particular, recent trends are more related to targeted or smart sanctions, including financial and travel sanctions. At the same time, many countries have also adopted sanctions as a blunt instrument to harm or target all countries. In this study, we consider not only the direct effects of smart sanctions but also the spillover effects of sanctions. We refer to existing theories and empirical studies (Felbermayr et al., 2021; van Bergeijk, 2021; Morgan et al., 2023) that confirm that economic sanctions have significantly hindered the overall performance of targeted states in terms of many economic aspects such as trade, foreign direct investment, economic growth, poverty levels, and political stability. Given the previous confirmation, an entire state might suffer a decline in the total economic output. If a firm does business or has any economic activity, it might be affected by the spillover effects of sanctions on the target state. One might argue that these companies do not have any sanctions and that their demand and normal business activities can be reduced.

To convince the readers how sanctions could affect the economy in general, we start with the findings from Benchimol and Palumbo (2024). This study uses daily web-scraped data to assess the impact of economic sanctions on consumer prices and product availability in Russia after the Ukraine invasion, revealing significant disruptions in price dynamics, particularly through

exchange rate channels, and highlighting the utility of online data for real-time policy analysis. To complement this study, Grebe et al. (2024) created a dataset of over eight million German Twitter posts on the Ukraine war, constructed a daily uncertainty index, and used a Vector Autoregression (VAR) model to show that uncertainty shocks significantly impact financial markets, economic activity, and inflation, especially in the early months of the conflict. It confirmed that the total Russian economy might have some shocks for all firms and businesses, which is confirmed in the literature (Neuenkirch and Neumeier, 2015). Therefore, the effects of sanctions could be heterogeneous between firms if firms have some incentive or support from the government.

2.4 Government actions and tax incentive during sanction waves

The literature indicates that countries facing sanctions might obtain some political responses (Hufbauer et al., 1990; Kaempfer and Lowenberg, 1988). They also confirm that sanctions are unlikely to achieve their objectives because of the costly implementation and responses from sanctioned states. Nigmatulina (2022) indicated that the sanctioned firms could grow better because they have a higher chance of winning the government bid to avoid targeted sanctions. In contrast, the study of Benzell and Lagarda (2017) depicts the mechanisms of how the Russian government has dealt with sanctions. Russia implemented capital controls, seized foreign assets, and moved toward economic autarky, attempting to limit the impact of foreign economic pressures and reduce dependence on external trade, especially in the energy sector. One of the potential explanations for why sanctions against Russian companies might not work is from the risk-sharing channel that they obtained ex-ante the 2014 war (Duong et al., 2024). Furthermore, Huynh et al. (2025) also found that Russian companies obtained abnormal stockpiling and share repurchase patterns in the years right before the 2014 war. It is also worth mentioning that Liadze et al. (2023) emphasized that Russia partly controlled capital flows entering and exiting the country by accepting only domestic currencies for gasoline transactions. However, the current literature did not examine how the Russian government supports firms and businesses by providing tax incentives to support the vulnerable time between all firms in the economy. In doing so, this paper contributes to the existing literature by exploring

the important channels through which the government could respond to foreign sanctions.

In the second part, we review the relevant studies on tax incentives that the government provides firms. The current literature attempts to answer how complex people respond to tax changes (Abeler and Jäger, 2015). In another context, Liu and Mao (2019) found that firms in areas of tax reform benefited by increasing 34.4 and 8.9 percent of their investment and productivity, respectively. During the day, the literature on tax incentives supported higher investment in less developed countries (Usher, 1977) since there are many ways to provide tax incentive support (such as the tax rate reduction, tax rate favor for the first business, etc.). However, the current literature has not explained how tax favors or incentives could support firms and businesses during the sanctioning period. In the accounting literature, some studies emphasize how firms could have incentives or penalties to report the correct earnings (Beneish, 1999) or an incentive for firms to have tax planning (Armstrong et al., 2012). In addition, Png and Zolt (1989) discussed the role of tax treatment in monetary sanctions, focusing on how firms should adjust their approach to external harm and penalties when subject to income taxation. It also proposes that adjustments in the tax system could better align firms' incentives with socially optimal outcomes. In summary, the existing literature on sanctions with government support and incentives has not explored the role of tax incentives from the Kremlin on the firm's outcomes.

3 A Stylized Model with Tax Incentives

We consider a stylized dynamic model with tax incentives to guide our empirical investigation of how Russian firms with tax incentives perform relative to firms without such incentives. Specifically, we incorporate incentives in the form of tax credit a là Greenwood and Huffman (1991) into an otherwise standard New-Keynesian model with capital in the spirit of Fernández-Villaverde and Rubio-Ramírez (2006, 2007) and Andreasen et al. (2017). Given our focus on Russian tax incentives, we will describe how tax incentives affect firms' problems and leave the rest of the model in the accompanying appendix.

3.1 Firms and Tax Incentives

The economic environment consists of a continuum of intermediate goods producers, each of which has access to a technology represented by the following production function

$$y_{it} = A_t k_{it-1}^{\alpha} (l_{it}^d)^{1-\alpha} - \phi z_t,$$

in which k_{it-1} the amount of capital used by the firm, l_{it}^d is the amount of labor employed by the firm and A_t is assumed to follow an AR(1) process $A_t = A_{t-1} \exp(\Lambda_A + z_{At})$ where $z_{At} = \sigma_A \varepsilon_{At}$ and $\varepsilon_A t \overset{\text{iid}}{\sim} N(0,1)$. Here ϕ is a parameter disciplining the fixed cost of production.

The intermediate goods firms solve a two-stage problem. First, the firms select how much capital k_{it-1} and labor l_{it}^d to rent, taking the input prices w_t and r_t as given under perfectly competitive factor markets. Specifically,

$$\min_{l_{it}^d, k_{it-1}} (1 - \tau_t)(w_t l_{it}^d + r_t k_{it-1}), \tag{1}$$

subject to the following supply curve

$$y_{it} = \begin{cases} A_t k_{it-1}^{\alpha} (l_{it}^d)^{1-\alpha} - \phi z_t & \text{for} \quad A_t k_{it-1}^{\alpha} (l_{it}^d)^{1-\alpha} \geq \phi z_t \\ 0 \quad \text{Otherwise} \end{cases}$$

In Equation (1), τ_t represents the tax incentive offered to the firm at time t and is assumed to follow an exogenous AR(1) process as follows

$$\log \tau_t = \rho^{\tau} \log \tau_{t-1} + \sigma^{\tau} \varepsilon_t^{\tau}, \tag{2}$$

where $\varepsilon_t^{\tau} \overset{\text{iid}}{\sim} N(0,1)$ and σ^{τ} governs the standard deviation of the shock process. In Equation (2), τ_t does not vary across firms since the model's equilibrium conditions imply that all firms are subject to the same marginal cost.[2] Our approach to modeling the tax incentives to these intermediate good

[2]Indeed, given that the firm has constant returns to scale, the real marginal cost (inclusive of incentives) is as

firms is motivated by the recent structure of the Russian tax incentive documented in Section 2.1. Intuitively, an unexpected increase in the tax incentive τ_t implies a decrease in the reported costs of the production process. Similarly, from the related literature, most Russian tax incentives are in the form of allowable deductions that allow firms to use production costs to offset their corporate tax obligations. These incentives allow Russian firms to lower overall costs, including tax obligations.

Our approach to incorporating τ_t into the firms' cost is motivated by the extent to which Russian firms can receive tax incentives, as summarized in Table 1. Indeed, many tax incentive schemes by the Russian tax authority are based on deductions on the cost associated with certain activities related to the production process. These incentives are also available as a reduction in the required social contribution. For example, Russian firms can receive tax incentives for research and development expenses or general investments.

Such an exposition of the tax incentives also follows the related theoretical literature on the dynamic effects of corporate tax incentives in closed (Greenwood and Huffman, 1991) and open (Bawa and Vu, 2020) economy settings. Specifically, while Greenwood and Huffman (1991) introduce incentives as tax credits on capital, here we consider tax credits that allow firms to claim incentives on both capital and labor costs.

In the second stage, the firms choose the price that maximizes their discounted real profits. In every period, only a fraction $1-\theta_p$ of firms can change their price, whereas the rest can only index their price to past inflation (i.e., via Π^{χ}_{t+k-1}). As is standard in the New-Keynesian literature, θ_p governs price stickiness. Specifically, the problem of the firms maximizing their stream of discounted profits $\left(\prod_{k=1}^{s}\Pi^{\chi}_{t+k-1}\frac{p_{it}}{p_{t+s}}-mc_{t+s}\right)y_{it+s}$ is as follows

$$\max_{p_{it}}\mathbb{E}_t\sum_{s=0}^{\infty}(\beta\theta_p)^s\frac{\lambda_{t+s}}{\lambda_t}\left\{\left(\prod_{k=1}^{s}\Pi^{\chi}_{t+k-1}\frac{p_{it}}{p_{t+s}}-mc_{t+s}\right)y_{it+s}\right\}, \tag{3}$$

follows

$$mc_t=(1-\tau_t)\left(\frac{1}{1-\alpha}\right)^{1-\alpha}\left(\frac{1}{\alpha}\right)^{\alpha}\frac{w_t^{1-\alpha}r_t^{\alpha}}{A_t}.$$

This expression implies that the marginal cost does not depend on firm i' index and thus all firms rent input at the same price.

subject to

$$y_{it+s} = \left(\prod_{k=1}^{s} \Pi_{t+k-1}^{\chi} \frac{p_{it}}{p_{t+s}} \right) y_{t+s}^{d},$$

where λ_t is the Lagrangian arising from the wage-setting problem of households. Given the perfectly competitive wage market, λ_t is common across all households, and thus, the subscript j is omitted.

The Rest of the Model. In the spirit of Fernández-Villaverde and Rubio-Ramírez (2006), the rest of the model is disciplined by a standard representative household that maximizes utility through consumption and leisure, subject to budget constraints involving saving, money holdings, and labor supply. Wage determination for the household is endogenous, with a downward-sloping demand curve and Calvo-style price stickiness. A final good sector aggregates a continuum of intermediate goods produced by monopolistically competitive firms described above. The monetary authority exogenously sets the one-period nominal interest rate via open market transactions in public debt. For brevity, we discuss the details of the model in the accompanying appendix.

Among all endogenous variables presented in the model, our key objects of interest are capital investment and return on assets. Aggregating across all households, our first object of interest, capital investment, is x_t where

$$k_t - (1-\delta)k_{t-1} - \mu_t \left(1 - S\left[\frac{x_t}{x_{t-1}} \right] \right) x_t = 0. \tag{4}$$

Intuitively, Equation (4) implies that, for the representative firm, capital investment is equal to the change in capital k_t, net of depreciation δ, and without any exogenous shock to capital investment efficiency μ_t. The firms' profits as defined in Equation (3). Our next object of interest is the returns on assets (ROA), which is defined as the ratio of profit over capital assets.

To infer the model's prediction vis à vis firms' responses to an increase in tax incentive τ_t, we solve the model by first-order approximation around its steady states. We then initiate a positive one-percent unexpected shock to the innovation ε_t^{τ} of the tax incentive τ_t and then consider how

each variable of interest responds to such a change.[3] We then plot the impulse responses of selected variables in Figure 2 and stress that these impulse responses are used to help guide us qualitatively on how tax incentives may help selected firms perform better than those without such incentives. Intuitively, these impulse responses can be interpreted as the responses to an unexpected one-percent change in tax incentive τ_t.

3.2 Testable Hypotheses

Intuitively, an unexpected positive tax incentive shock induces a decrease in marginal cost, increasing capital expenditure since firms are now more profitable at the margin. Such an increase leads to an overall increase in return on assets since net profits, subject to first-order effects from the tax incentive, grow more than the change in capital asset.

[Figure 2 here]

To see how this mechanism materializes in the model, Figure 2 presents selected impulse responses (in percentage deviation from the steady states) to a one-percent increase in tax incentive τ_t, where the horizontal axis denotes the period after the shock. Real marginal cost mc_t, arises from the cost minimization of the intermediate firms defined in Equation (1).[4] Firm revenue is defined as the sum of the firms' profits and costs. Figure 2 shows that, following a tax incentive, profit rises more than capital expenditure, leading to an overall increase in returns on assets.

In parallel to the context of Russian firms and sanctions, the model predictions imply that firms that receive tax incentives are expected to do better than firms without such tax incentives, according to the key objects of interest. Specifically, the former are expected to exhibit higher capital expenditure and returns on assets in response to an increase in tax incentives. These model implications motivate us to consider two testable hypotheses as follows:

[3] We leave the details of implementing such an exercise in the appendix. Except for the standard deviation of the tax incentive shock $\sigma^T = 0.01$ and its persistence $\rho^\tau = 0.9$, the rest of our stylized parameterization of the model follows Fernández-Villaverde (2010).

[4] To maintain consistency across the five objects of interest, we normalize the real marginal costs by firms' profits.

Hypothesis I. Firms with tax incentives exhibit higher capital expenditure than firms without such incentives.

Hypothesis II. Firms with tax incentives exhibit higher returns on assets than firms without such incentives.

4 Empirical Approach

4.1 Tax Incentive Measure

To construct our measure of the tax incentives, we first estimate the following regression using data up to and including 2013

$$\Gamma_{it} = \rho\Gamma_{it-1} + \gamma\mathbb{X}_{it} + \eta D_t + \varepsilon_{it}. \qquad \forall t < 2014, \tag{5}$$

where Γ_{it} is the amount of corporate tax paid over income for firm i in year t, $\mathbb{X}_{it}$ is a set of firm characteristics, D_t denotes year dummies, and ε_{it} is the innovation term. ρ is included to capture the persistence in tax burden. Given the estimates of ρ and γ, we then construct the tax incentive measure Incentive_i for firm i in sector s as follows

$$\text{Incentive}_i = \begin{cases} 1 & \text{if} \quad \Gamma_{iT} \leq \mathbb{E}_T(\hat{\rho}\Gamma_{iT-1} + \hat{\gamma}\mathbb{X}_{iT} + \hat{\eta}D_t | i \in \mathbb{S}_s) \\ 0 & \text{Otherwise} \end{cases} \qquad \text{where } T = 2013, \tag{6}$$

where $\hat{\rho}$ and $\hat{\gamma}$ are estimated from Equation (5), and $\mathbb{S}_s$ denotes set of firms in sector s to which firm i belongs.

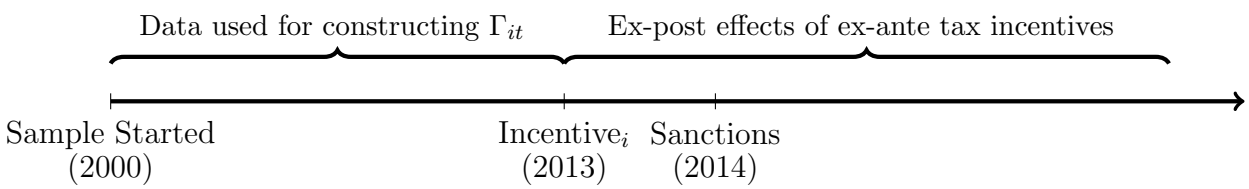
Figure 1 illustrates the timing of the exogenous tax incentive variable relative to the timing of the sanctions on Russia in 2014. Specifically, we first estimate the predicted average tax rate $\hat{\Gamma}_{it}$ that firm i should have been subject to before the series of sanctions imposed on Russia in 2014 (that is, $t < 2014$) using Equation (5). We then use this estimate of $\hat{\Gamma}_{it}$, but only for 2013 (i.e.,

right before the sanctions), to compute that unexpected deviation from the actual tax rate Γ_{it} in 2013 relative to the predicted tax rate $\hat{\Gamma}_{it} = \hat{\rho}\Gamma_{it-1} + \hat{\gamma}\mathbb{X}_{it} + \hat{\eta}D_t$ in 2013, averaging across all firms in sector s to which the firm belongs. If such a deviation for firm i is negative, then the firm is considered to have received tax incentive *ex-ante*; that is, the tax incentive variable Incentive_i would take a value of one. Conversely, if such a deviation is positive, the tax incentive variable Incentive_i would take a zero value. Intuitively, $\text{Incentive}_i = 1$ implies that firm i paid less tax in 2013 than expected, and $\text{Incentive}_i = 0$ implies that firm i either paid more tax than expected in 2013 or that they paid the same amount of tax as expected. We note that in Equation 6, Incentive_i is computed based on firm i tax burden relative to the average predicted tax rate for all firms in the sector it belongs.

To understand what Incentive_i actually captures, it is first important to note two key features in constructing such a variable. First, we control for firm-level characteristics in Equation 5. The impetus behind this approach is to account for all *expected* tax incentives that firms could have received *ex-ante*. For example, as noted in Table 1, certain Russian firms can receive investment tax deductions, tax relief based on their Special Purpose Investment Contract (SPIC), or on their R&D activities, all of which are firm-specific. Given our controlling for these firm-specific characteristics in the first stage (i.e., Equation 5), the constructed innovation ε_{it} is the predicted component of tax burdens constructed based on firm-level characteristics $\mathbb{X}_{it}$. Second, we compute the incentives relative to the average predicted values across all firms in their sector in Equation 6. By doing so, we isolate the effects of sector-specific tax incentives from Incentive_i. For example, as noted in Table 1, Russian firms in specific sectors (e.g., information technology or oil) can receive unique tax treatments.

Combined, our two-stage method described in Equations 5 and 6 aims to provide an unexpected measure of tax incentive that captures unexpected exogenous tax incentive shock beyond what can be predicted based on firm-level characteristics and *ex-ante* sector-specific tax incentive mandates (see, for example, Table 1). Since firms are legally required to pay tax net of any reduction due to

Figure 1: Tax Incentives and Sanction Timings



variations in firm-level characteristics and *ex-ante* sector-based incentive provisions, any deviation from the predicted tax rate that the firms are subject to is, therefore, attributable to changes in tax incentive structure that the government imposes in the year before the sanction.

4.2 Identification and Empirical Specification

Our benchmark empirical specification is as follows

$$Y_{it} = \mu + \tau_1 \text{Incentive}_i \times \text{Post } 2014_t + \tau_2 \text{Post } 2014_t + \tau_3 \text{Incentive}_i + \xi \mathbb{X}_{it} + \alpha_i + \beta_t + \varepsilon_{it}, \quad (7)$$

where Y_{it} is a measure of firm outcome, Incentive$_i$ is the indicator whether firm i received tax incentives before 2014, Post 2014_t is a variable that takes a value of one of observations on and after 2014 and zero otherwise. $\mathbb{X}_{it}$ contains selected firm-specific controls. α_i and β_t are the fixed effects in time and firm, respectively. Our key coefficient of interest is τ_t, which captures the extent to which firms with exogenous tax incentives in 2013 (i.e., ex-ante) perform better according to the measure of firm outcome Y_{it} relative to firms that do not experience such incentives.

To address the possibility of firm-specific characteristics affecting their exposure to sanctions, we exploit the broad timing of nationwide sanctions against Russia (i.e., via Post 2014_t) instead of considering firm-specific targeted sanctions. Specifically, sanctioned firms might have already been drawing Western attention before sanctions, which suggests a potential endogeneity issue with their selection based on firm characteristics. In addition, while a nationwide sanction can affect an individual firm, no single firm can influence Russia's decision to impose such sanctions.

To verify the robustness of our empirical benchmark specification with respect to the parallel

trend assumption, we also estimate the effects of tax incentives on key outcome variables using a synthetic difference-in-difference approach in the spirit of Arkhangelsky et al. (2021). In addition, we also vary the sanction timing by assuming that sanction and tax incentives happened a year before. We find that our results are not driven by such arbitrary assignments of both sanction and tax incentive timings. We leave the details of these exercises, among other robustness checks, in Section 7.

5 Data

5.1 Data Sources

Our data set comes from the SPARK-Interfax database, which aggregates official and publicly available data on balance sheets, taxes, employment, and ownership at the firm level for Russian companies over specific years. This data set provides a comprehensive panel of Russian companies, including private and state-owned companies, in various industries such as manufacturing, services, energy, and agriculture. Additionally, the data set includes a tax authority identifier, allowing us to track the corporate tax payments of firms in each specific year. In addition, this comprehensive data could help us identify the broader scope of Russian firms than using Orbis or listed firms only. This data set provides all accounting and financial data that firms should submit to the tax authority so that we can observe the firm outcomes and the tax contribution.

Our final dataset used for regression spans 2010 to 2023, whereas the raw dataset used to construct the tax incentive measure spans 2000 to 2013. We started in 2010 when it came to the main regression analysis, which excluded periods of recession due to the financial crisis. Since we employ the difference-in-difference strategy for the 2014 event ('the Annexation of Crimea'), we only keep firms having at least two observations before and after 2014. Therefore, our sample covers at least 3,675,491 firm-year observations with 404,359 unique Russian firms for further estimations.

There are several advantages to using the SPARK-Interfax database, compared to the exist-

ing literature using Orbis (Gaur et al., 2023) or listed firms (Huynh et al., 2025). First, the data set is retrieved from various official sources and is regularly updated. The provider also offers instant verification of notary documents, allowing users to confirm the authenticity of counterparties' documents against official records. Financial reports and analyses are available by both local accounting standards and International Financial Reporting Standards (IFRS). In summary, using the SPARK-Interfax database would cover the highest number of Russian companies, including listed and private companies.

5.2 Descriptive statistics

Table 2 reports the descriptive statistics of our variables, which will be used to answer questions about how firm outcomes respond to the tax incentive before and after the shock in 2014.

[Table 2 Here]

In our data, 10.36% of the treated observations received a tax incentive from 2010-2023. On average, Russian firms exhibit positive returns on assets and equity. These companies hold approximately 14.53% of their total assets in cash and cash equivalents, and their total debt amounts to 73.75% of the total assets. Given that the firm age and the number of employees are expressed in natural logarithms, the corresponding average firm age and the average number of employees are 20 years and 192 people, respectively. We also present the differences in our variables of interest between the two groups in the Appendix A2. Firms with tax incentives exhibit lower capital expenditure and return on assets. In addition, these firms are smaller in terms of total assets and the number of employees compared to their counterparts. However, they hold more cash, use more debt, and achieve a higher return on equity.

6 Results

6.1 Main Result: Tax Incentives and Firm Performance

We present our baseline results from Equation 7 in Table 3. Among all estimated coefficients, the key coefficient of interest is one on the interaction term *Tax Incentive* × *Post 2014*, which captures the extent to which firms with ex-ante tax incentives perform differently relative to firms without such incentives post-2014. In Table 3, the two firm performance outcome variables considered include *Capex* (Columns 1-2) and *ROA* (Columns 3-4). For every firm outcome, we first estimate the model without control variables, followed by a specification that includes firm-level control variables. These two outcome variables reflect the two hypotheses that we considered in Section 3.

The significant and positive estimates for the interaction terms across all columns in Table 3 suggest that firms with ex-ante tax incentives tend to exhibit more positive outcomes than those without such incentives in 2014. Specifically, compared to firms without tax incentives, firms with tax incentives are more likely to increase their capital expenditures (about 2.49% in Column 2) and exhibit enhanced firm performance as measured by their ROA (0.11% in ROA in Column 4). These results are qualitatively consistent with the two hypotheses we considered under the stylized model presented in Section 3.

[Table 3 Here]

Our results in Table 3 contribute to the related literature documenting the potential channels by which firms employ to deal with sanctions such as trade risk-sharing channels (Duong et al., 2024), stockpiling Huynh et al. (2025), or government support in terms of possessing state ownership or government bids (Gaur et al., 2023; Nigmatulina, 2022). Specifically, here, we document that tax incentives can serve as another channel through which the impact of sanctions on firms can be alleviated.

6.2 Mechanisms

In the baseline regressions, we find that after 2014, firms with tax incentives are able to mitigate the impact of sanctions by continuously increasing capital investments and maintaining strong performance. This section explores the mechanisms through which tax incentives help Russian firms overcome the effects of the 2014 sanctions.

Based on the hypotheses developed in Sections 3.1 and 3.2, we argue that firms sustain investments and demonstrate strong performance because tax incentives increase revenue and profit, even as the number of employees declines and labor costs decrease. We present the results in Table 4. Economically, revenue and profit increase by 173% (Column 2) and 49.17% (Column 4), respectively, while the number of employees and labor costs decrease by 12.77% (Column 6) and 3.68% (Column 8), respectively.

Overall, the findings in Table 4 support our hypotheses regarding the mechanisms through which tax incentives boost firm performance (i.e., increased revenue and profit) while reducing operational costs (i.e., employment and labor costs).

[Table 4 Here]

6.3 Heterogeneity of tax incentive effects across industries

In this section, we provide additional findings for a heterogeneity analysis of tax incentives on capital expenditure (Figure 3a) and return on assets (Figure 3b) across different industries.

[Figure 3 Here]

Figure 3a shows that, with the exception of three industries, oil mining, financial services, and agriculture, most sectors do not show significant increases in capital expenditure after receiving tax incentives. Surprisingly, the largest effect of the tax incentive is observed in the military industry. Compared to firms that did not receive tax incentives, those that did receive them are approximately 36% more likely to increase their capital expenditures. In contrast, firms in other industries show

only marginal effects, averaging around 3%. Our findings are also consistent with the existing literature that highlights the sharp increase in Russia's military budget after 2014, despite mounting economic challenges (Cooper, 2016). An unexpected finding follows another. In figure 3b, it turns out that the military industry does not exhibit better financial performance, despite showing higher capital expenditure, which typically indicates strong investment activity. The estimated coefficients for the oil and mineral sector and agriculture lack precision. It can be understandable that financial services still perform better, as demonstrated in the literature (Girardone, 2022). When it comes to the magnitude of other coefficients, compared to firms without tax incentives, firms having this scheme after 2014 would have a higher ROA by approximately 0. 35% to 0.65%.

6.4 Additional Results

6.4.1 The Effects on State-owned enterprises (SOE) and non-SOE: Triple Diff with non-SOE

Gaur et al. (2023) and Nigmatulina (2022) document that firms with state ownership or those engaged in government procurement are better able to withstand the impact of sanctions. Accordingly, this section examines whether the effect of tax incentives is more or less pronounced among state-owned enterprises (SOEs). Specifically, we estimate the following regression specification

$$\begin{aligned} Y_{it} = \mu &+ \tau_1 \text{Incentive}_i \times \text{Post } 2014_t \times \text{Non-SOE}_i \\ &+ \tau_2 \text{Incentive}_i \times \text{Post } 2014_t + \tau_3 \text{Incentive}_i \times \text{Non-SOE}_i + \tau_4 \text{Non-SOE}_i \times \text{Post } 2014_t \\ &+ \tau_5 \text{Post } 2014_t + \tau_6 \text{Incentive}_i + \tau_7 \text{Non-SOE}_i \\ &+ \xi \mathbb{X}_{it} + \alpha_i + \beta_t + \varepsilon_{it}, \end{aligned} \tag{8}$$

where Non-SOE_i is a dummy variable indicating whether firm i is not owned by the state and the remaining variables are defined analogously to ones in Equation 7.

Table 5 presents our empirical results. In particular, we construct a dummy variable, Non-SOE, which is equal to one for non-state-owned firms and zero otherwise. We interact with this variable

with Incentive and Post 2014. The estimated coefficients in the triple interaction term, 'Non-SOE × Tax Incentive × Post 2014', are consistently positive in Table 5. These positive coefficients suggest that the effect of tax incentives after 2014 is more pronounced among non-state-owned firms. Non-SOEs experienced improved profitability (ROA) after 2014 when benefiting from tax incentives, suggesting greater operational efficiency compared to SOEs or the pre-2014 period. However, the aggregate effect of the triple interaction term *Non-SOE* × *Incentive* × *Post 2014* is estimated at −0.146 for *Capex* and −0.018 for *ROA*.

Our findings are novel in that, unlike Gaur et al. (2023) and Nigmatulina (2022), who focus on the resilience of state-linked firms under sanctions, we provide evidence that tax incentives are particularly crucial for non-state-owned firms in mitigating the adverse effects of sanctions. Furthermore, the existing literature has pointed out that SOE firms may benefit from government support through various channels, such as winning government contracts or leveraging political connections (Huynh et al., 2025). Our findings on tax incentives complement this literature by examining their effects on ordinary (i.e., non-SOE) firms.

[Table 5 Here]

6.4.2 Sub-sample analyses with State-owned enterprises

In Section 6.4.1, we use the triple interaction term - 'Non-SOE × Incentive × Post 2014' to examine if the tax incentives remain significant among non-state-owned firms. In this section, we conduct the tests only for a sub-sample of state-owned firms (SOEs) only. All specifications are similar to Equation 7.

We present our results in Table 6. The estimated coefficients of the interaction term 'Non-SOE × Tax Incentive' in columns 1 and 2, where the dependent variable is 'Capex', are negative and statistically significant. In columns 3 and 4, where the dependent variable is ROA, the estimated coefficients of the same interaction are also negative but statistically insignificant. These results suggest that tax incentives after 2014 are not relevant for state-owned firms. In fact, they may even

discourage capital investment while having no discernible effect on firm performance.

Our findings highlight a substitution effect between state ownership and tax incentives: firms with state support appear to rely less on tax incentives to sustain investment and performance. This contrasts with Gaur et al. (2023) and Nigmatulina (2022), who emphasize the protective role of state ownership under sanctions, but do not examine its interaction with tax-based policy tools.

[Table 6 Here]

6.4.3 Additional findings: Effects of tax incentives on cash, ROE, and leverage

In this section, we further examine whether other firm outcomes are affected by tax incentives after 2014. Table 7 presents the results for a range of firm-level indicators: the Cash ratio (Columns 1 and 2), the Leverage ratio (Columns 3 and 4), ROE (Columns 5 and 6), and Intangible Assets (Log) (Columns 7 and 8). We find that tax incentives implemented after 2014 are associated with increases in corporate cash holdings, debt financing, and returns on equity. However, firms are less likely to increase their intangible assets during this period.

[Table 7 Here]

These findings support our baseline results, suggesting that tax incentives after 2014 help firms improve operational outcomes, such as revenues and profits, while also reducing costs. As a result, firms accumulate more cash, gain better access to external debt financing, and deliver stronger returns to equity holders. However, despite the increase in capital expenditures, companies do not invest significantly in intangible assets. Firms may need more time for investments in intellectual property and goodwill, especially in the aftermath of sanctions.

7 Robustness

In this section, we consider how sensitive our benchmark results in Section 6.1 are to a variety of robustness checks. The impetus behind these exercises is to check on several assumptions underlying

estimating Equation 7. First, given the use of generated regressors in Equation 7, we re-estimate such an equation and report bootstrapped standard errors. Our results are consistent across other clustering methods for standard errors. Second, to understand how our results are consistent in light of the possibility that firms with and without ex-ante tax incentives are inherently different, we leverage the synthetic difference-in-difference estimator a là Arkhangelsky et al. (2021) and find that the estimated average treatment effects are largely consistent with our benchmark regression. Third, we randomize the treatment of ex-ante tax incentives across all firms in the sample and find that our results are not driven by any particular arbitrary draw of these incentives. Fourth, we consider whether anticipation effects can play a role in our results, documenting that our timing of both the sanctions and the tax incentives is non-arbitrary: our empirical results no longer hold when we randomize the tax treatment and assign sanctions to happen the year before. Fifth, we consider an alternative methodology for identifying firms and their subsidiaries. Overall, we find our benchmark results in Section 6.1 to be consistent across these exercises.

7.1 Alternative Standard Errors

7.1.1 Bootstrapping: Generated Regressors

To assess the robustness of our baseline results, we re-estimate the main specification using bootstrapped standard errors rather than conventional robust standard errors. This approach accounts for potential sampling variability, especially in the presence of generated regressors and possible heteroskedasticity that may not be fully addressed by robust standard errors alone (Cameron et al., 2008). The bootstrap estimates are reported in Table 8. Across all specifications with 50 bootstraps, the estimated coefficients of interest—particularly the interaction term *Tax Incentive* × *Post 2014* — remain statistically significant and directionally consistent with our baseline results presented in Table 3.

[Table 8 Here]

For example, the effect of tax incentives on capital expenditures and firm performance remains

positive and economically meaningful, reinforcing the interpretation that tax support continues to benefit firms in the post-2014 sanction environment. These findings confirm that our core results are not sensitive to the method of estimating standard errors and further validate the robustness of our empirical strategy.

7.1.2 Alternative Clustering of Standard Errors

To ensure that our baseline results in Table 3 are not driven by the choice of clusters of standard errors, we reconduct the tests using different clusters of standard errors in Table 9. For every firm outcome, we first employ the standard errors clustered at the firm and year levels, while in the following model, we use the standard errors clustered at the industry level. Our results remain statistical and economic magnitudes across the firm outcomes. For example, compared to firms without tax incentives, firms with tax incentives have a more tendency to invest more in capital expenditures (about 3% in column 2), improve firm performance (0. 05% in ROA in column 4 and 0. 13% in ROE in column 6), hold more cash and cash equivalents (1. 67% in column 8), and raise more leverage (47. 8% in column 10).

[Table 9 here]

7.2 Synthetic Difference-in-differences

We estimate Equation (7) using a synthetic difference-in-difference approach in the spirit of Arkhangelsky et al. (2021). Intuitively, such an approach attempts to align the pre-sanction trends between the treated and control groups to provide a precise estimate of the effects of tax incentives across the two groups of firms without heavy reliance on the parallel trend assumption. Specifically, we estimate the causal effects of having tax incentives by computing

$$(\hat{\tau}^{did}, \hat{\mu}, \hat{\alpha}, \hat{\beta}) = \underset{\tau,\mu,\alpha,\beta}{\arg\min} \left\{ \sum_{i=1}^{N} \sum_{t=2010}^{T} (Y_{it} - \mu - \alpha_i - \beta_t - \mathbb{W}_{it}\tau)^2 \hat{\omega}_i^{sdid} \hat{\lambda}_t^{sdid} \right\}, \tag{9}$$

where i is the firm subscript and t is the year subscript. As in Arkhangelsky et al. (2021), here we choose $\hat{\omega}_i^{sdid}$ and $\hat{\lambda}_t^{sdid}$ to optimize the average squared difference in trend between the treatment and control groups subject to a regularization parameter. In Equation 9, $\mathbb{W}_{it}$ denotes the treatment for firm i in year t (i.e., having received ex-ante tax incentives at the time of the sanctions). This process balances between overfitting and having a substantial increase in bias. To obtain the average treatment effects of tax incentive post-sanction and the corresponding standard errors, we leverage previous work by Clarke et al. (2023). As in the benchmark regression in Equation 7, in Equation 9 we also restrict to final regression sample to the period post-2010.

[Table 10 Here]

Table 10 presents the average treatment effects of having ex-ante tax incentives during 2014 sanctions on Russian firms' key fundamentals. To remain consistent with our benchmark regression results in Table 3, we consider two dependent variables: Capex and ROA, the average treatment effects of which are presented in columns (1)-(2), respectively. These two variables reflect the benchmark dependent variables considered in Table 3. Across all columns, we obtain the bootstrapped standard errors and the corresponding p-values based on large-sample approximations a là Arkhangelsky et al. (2021). The positive and consistently significant estimates in Table 10 suggest that Russian firms with ex-ante tax incentives during 2014 sanctions performed better than firms without such incentives across the five metrics considered. These estimates and their significance are largely consistent with our benchmark results in Table 3.

7.3 Placebo

Our results are robust across different tests, especially when we conduct a placebo test, randomly assigning tax incentives to firms in our sample instead of using the constructed tax incentive in our Section 4.1. Specifically, we estimate Equation 7 using the placebo distance and repeat this exercise 2000 times.

Figure 4a and Figure 4b presents the distribution of the estimates for the interaction term

between Tax Incentive and Post 2014 over the 1,000 replications using placebo distance. The outcomes of interest are Capex in Figure 4a and ROA in Figure 4b.

In each figure, we also overlay the estimate using the actual Tax Incentive x Post 2014 using a vertical line. In no instance in Figure 4a and Figure 4b is Tax Incentive x Post 2014 precisely estimated. Our estimate using actual data is indeed well below the 1% values for both distributions of placebo estimates. These result indicates that our main results are unlikely to be driven by a random draw of tax incentive.

[Figure 4 Here]

7.4 Tax Incentives and Sanctions: Alternative Timing of Sanctions

To understand the relevance of the sanction timing, we re-estimate Equation (7), assuming that the sanctions on Russia happened in 2013 instead of the actual implementation in 2014. Specifically, we first re-estimate the tax incentive measure by estimating Equation (5) to compute the *predicted* tax burden using data before 2013. We then use the new estimates for ρ, γ, and η from Equation (5) to construct the tax incentive measure for each firm i relative to their predicted value using Equation (6). We then use this new tax incentive measure (i.e., tax incentive in 2012) and estimate the following equation:

$$\begin{aligned} Y_{it} = \mu &+ \tau_1 \text{Incentive (in 2012)}_i \times \text{Post 2013}_t + \tau_2 \text{Post 2013}_t + \tau_3 \text{Incentive (in 2012)}_i \\ &+ \xi \mathbb{X}_{it} + \alpha_i + \beta_t + \varepsilon_{it}. \end{aligned} \tag{10}$$

Table 12 presents the estimates of Equation (10). The coefficient of interest in Equation (10) is τ_1, which captures the extent to which firms receiving tax incentives in 2012 exhibit better outcomes (i.e., Capex and ROA) relative to firms without such incentives post-2013. Table 12 shows no significant difference in Capex and ROA between firms receiving tax incentives in 2012 and those that did not post-2013. This result starkly contrasts our benchmark estimates in Equation

(3), which suggests that the timings of both the tax incentives and sanctions matter for these two firm outcomes.

[Table 12 here]

7.5 Aggregation of unique-tax ID

The SPARK-Interfax provides information about the identifiers for firms as 'Spark ID' and also 'Registration ID'. One 'Spark ID' can be registered by multiple 'Registration IDs'. Therefore, in this section, instead of using firm fixed effects (i.e., using 'Spark ID' fixed effects), we use 'Registration ID' fixed effects. We present the results in Table 13. Our results remain statically unchanged, compared to the baseline results.

[Table 13 here]

8 Conclusion

Although the existing literature highlights several mechanisms that can explain the limited effectiveness of sanctions against Russia, such as the risk-sharing channel (Duong et al., 2024) and government ties or political connections (Nigmatulina, 2022; Gaur et al., 2023), we propose a novel measure of unexpected firm-level tax incentives that is exogenous to firm characteristics and other predictors of corporate taxation from approximately 400,000 Russian firms over the period from 2010 to 2023. Using this proxy to classify firms into two groups: those with tax incentives and those without, we find that firms receiving tax incentives before the first wave of sanctions in 2014 exhibit higher capital investment and improved financial performance compared to firms that did not receive any incentives. This finding can be explained by mechanisms from an increase in firm revenue and profits and a decline in firms' labor costs.

Our empirical findings explicitly allow for the effects of tax incentives on firm financial performance to vary between two groups including state-owned enterprises and private firms. In addition,

our additional findings remain robust for other financial indicators such as cash flow, return on equity, and financial leverage. We also observe the heterogeneity of this effect in different industries. We also performed several robustness checks to ensure the consistency and reliability of our estimates. These include placebo tests, bootstrapped regressions, alternative clustering methods, a synthetic difference-in-differences approach to address the parallel trends assumption, and alternative timing constructions to demonstrate the importance of the cut-off points. Our findings suggest that targeted tax incentives can help firms alleviate the negative effects during periods of economic sanctions. Although there are target sanctions for specific individuals or firms, this study explores that the Kremlin is likely to use tax policy as a strategic tool to support firms, particularly in vulnerable or strategic sectors during sanctions. The heterogeneous impact on state-owned and private companies highlights the need for customized approaches to smart sanctions.

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Table 1: Summary of Tax Incentive Schemes

Tax incentive schemes	**Cost-based nature**	**Description**	**Tax rate discount**
Regional tax support	Yes	Project owner benefit from a reduced profits tax rate and/or regional subsidies	From 15% to 100%
Special Economic Zones (SEZs)	Yes	Companies in this area may benefit from a reduced profit tax rate and social contributions	Up to 13.5% or 100%
Investment tax deduction	Yes	Profits tax reduction is based on amount of capital investment, labor costs, or equipment	Up to 90%
IT Sector tax incentive	Yes	Since January 2021, software and electronics developers benefit from tax reduction	Approximately 7.6% (or 3% profit tax reduction)
Natural oil sector tax incentive	No	Since 2021, eligible companies can receive profit tax reduction and export duty exemption	Income from Arctic operations making up 90% of total revenue
R&D activies, patent, and grant	Yes	Companies can be eligible for reducing for R&D spending and related innovation activities	Up to 150 and 7.6% for social insurance cost
Special Purpose Investment Contract (SPIC)	Yes	Under SPIC agreements, the government ensures tax privileges over a long term	Flexible for SPIC (up to 100%)

Notes: This table summarizes key tax incentives used to support Russian businesses, especially under sanctions. These include profit tax reductions, R&D (Research and Development) super deductions, and regional subsidies. Programs like SEZs (Special Economic Zones), SPICs (Special Purpose Investment Contract), and RIPs offer 0–13.5% tax rates, while IT and oil sectors receive special exemptions.

Table 2: Descriptive Statistics

	Obs.	Mean	Std.	Median	Min	Max
Post 2014	4,600,855	0.7688	0.4216	1.0000	0.0000	1.0000
Tax Incentive	4,600,855	0.1036	0.3048	0.0000	0.0000	1.0000
Capex	2,972,063	0.3120	0.3086	0.2022	0.0002	1.0000
ROA	3,963,591	0.0009	0.0038	0.0003	-0.0145	0.0175
Revenue (Log)	4,009,106	16.3968	2.6610	16.4704	0.6931	22.3929
Profit (Log)	2,424,119	15.0973	2.8781	15.2676	0.6931	21.1455
Labor Cost	889,858	0.2250	0.2798	0.1471	0.0000	1.9506
Cash	4,049,269	0.1453	0.2361	0.0372	0.0000	1.0000
Leverage	3,761,859	0.7375	1.2772	0.5190	0.0000	10.4561
Intangible Assets (Log)	353,413	11.5609	3.0913	11.2385	0.6931	19.3415
Firm Age (Log)	4,600,855	5.5614	0.2721	5.5607	5.0370	6.0014
Assets (Log)	4,401,548	16.0230	2.7980	16.1179	0.6931	22.4627

Notes: This table presents the descriptive statistics for all variables. The survey data covers a total of 2,972,063 firm-year observations from the years 2010 to 2023 with 310,290 unique firms without having any missing data of the variable 'Capex' (Capital expenditure). 'Post-2014' is a dummy variable, assigned a value of 'one' for the period following 2014 (the Annexation of Crimea) and 'zero' for the years prior. The variable 'Tax Incentive' is a dummy variable, with a value of 'one' for the treated firms, as defined in Section 4.1, and 'zero' for the control firms. The 'Capex' variable is calculated as the amount of money a firm invests in capital expenditures divided by its total assets. 'ROA' is the ratio of calculating income to the asset. 'Revenue (Log)' and 'Profit (Log)' are the natural of logarithm of firm revenue and profit, respectively. 'Employees (Log)' is estimated by the natural logarithm of the number of employees. 'Labor Cost' is the ratio of cost paying for labor to revenue. 'Assets (Log)' is constructed by the natural logarithm of the amount of total assets. 'Cash' is the amount of cash and cash equivalents on the firm's balance sheet scaled by the total assets. 'Leverage' is measured by total debts over total assets. 'Firm Age (Log)' is the natural logarithm of the number of months that firm is established.

Table 3: Baseline results: Tax incentives and firm outcomes

	Capex_{it}		ROA_{it}	
	(1)	(2)	(3)	(4)
Tax Incentive × Post 2014	0.0350***	0.0299***	0.0008***	0.0008***
	(0.0021)	(0.0020)	(0.0000)	(0.0000)
Firm Age (Log)		0.0933***		0.0000***
		(0.0006)		(0.0000)
Assets (Log)		-0.0229***		-0.0000***
		(0.0001)		(0.0000)
Industry and Year FEs	Yes	Yes	Yes	Yes
Adjusted R-squared	0.1338	0.1769	0.0053	0.0059
Observations	2,972,063	2,972,063	3,963,591	3,959,485

Notes: This table presents all baseline results for the effects of $Tax\ Incentive_i$ on $Capex_{i,t}$, and $ROA_{i,t}$, where we estimate equation (7). Depending on the specifications, we also include (columns 2 and 4) and exclude (columns 1 and 3) $Firm\ Age\ (Log)_{i,t}$ and $Assets\ (Log)_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Mechanisms results: Revenue, Profit, and Labor Cost

	Revenue $(\text{Log})_{it}$		Profit $(\text{Log})_{it}$		Labor Cost_{it}	
	(1)	(2)	(3)	(4)	(5)	(6)
Tax Incentive × Post 2014	0.9689***	0.8199***	0.2154***	0.2015***	-0.0378**	-0.0459***
	(0.0219)	(0.0174)	(0.0195)	(0.0134)	(0.0183)	(0.0177)
Firm Age (Log)		-0.0118***		0.1032***		0.0613***
		(0.0031)		(0.0042)		(0.0010)
Assets (Log)		0.7835***		0.8068***		-0.0199***
		(0.0005)		(0.0004)		(0.0001)
Industry and Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0537	0.6456	0.0555	0.6654	0.0990	0.1462
Observations	4,009,102	4,002,688	2,424,231	2,421,645	889,853	889,473

Notes: This table presents the results for the effects of *Tax Incentive*$_i$ on *Revenue*$_{i,t}$, *Profits*$_{i,t}$, and *Labor Costs*$_{i,t}$ by estimating equation (7). Depending on the specifications, we also include (columns 2, 4, and 6) and exclude (columns 1, 3, and 5) *Firm Age (Log)*$_{i,t}$ and *Assets (Log)*$_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Effects on Non-State-Owned Enterprises

	Capex_{it}		ROA_{it}	
	(1)	(2)	(3)	(4)
Non-SOE × Tax Incentive × Post 2014	0.1265***	0.1101***	0.0009***	0.0009***
	(0.0164)	(0.0160)	(0.0002)	(0.0002)
Tax Incentive × Post 2014	-0.0853***	-0.0737***	-0.0002	-0.0001
	(0.0163)	(0.0158)	(0.0002)	(0.0002)
Non-SOE × Post 2014	-0.0200***	-0.0225***	-0.0000	-0.0000
	(0.0031)	(0.0030)	(0.0000)	(0.0000)
Non-SOE × Tax Incentive	-0.1146***	-0.0972***	-0.0008***	-0.0008***
	(0.0114)	(0.0108)	(0.0001)	(0.0001)
Non-SOE	-0.0528***	-0.0795***	0.0008***	0.0008***
	(0.0026)	(0.0025)	(0.0000)	(0.0000)
Firm Age (Log)		0.0905***		0.0000***
		(0.0006)		(0.0000)
Assets (Log)		-0.0233***		-0.0000***
		(0.0001)		(0.0000)
Industry and Year FEs	Yes	Yes	Yes	Yes
Adjusted R-squared	0.1347	0.1785	0.0058	0.0063
Observations	2,972,063	2,972,063	3,963,591	3,959,485

Notes: This table presents the estimates from Equation 8, in which our focus is on how being non-state-owned can impacts the effects of tax incentives on $Capex_{i,t}$, and $ROA_{i,t}$. Depending on the specifications, we also include (columns 2 and 4) and exclude (columns 1 and 3) $Firm\ Age\ (Log)_{i,t}$ and $Assets\ (Log)_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Additional mechanisms results: Sub-sample from Only State-Owned Enterprises

	Capex_{it}		ROA_{it}	
	(1)	(2)	(3)	(4)
Tax Incentive × Post 2014	-0.0801***	-0.0704***	-0.0001	-0.0001
	(0.0163)	(0.0159)	(0.0002)	(0.0002)
Firm Age (Log)		-0.0009		0.0001***
		(0.0050)		(0.0000)
Assets (Log)		-0.0207***		0.0000***
		(0.0003)		(0.0000)
Industry and Year FEs	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0717	0.1236	0.0058	0.0101
Observations	47,977	47,977	47,587	47,573

Notes: This table presents all results for the effects of *Tax Incentive*$_i$ on *Capex*$_{i,t}$, and *ROA*$_{i,t}$, where we estimate equation (7) and focus only on the state-owned enterprises (SOE). Depending on the specifications, we also include (columns 2 and 4) and exclude (columns 1 and 3) *Firm Age (Log)*$_{i,t}$ and *Assets (Log)*$_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 7: Additional results: Other financial outcomes

	Cash_{it}		Leverage_{it}		ROE_{it}		Intangible Assets $(\text{Log})_{it}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax Incentive × Post 2014	0.0462***	0.0394***	0.3982***	0.4522***	0.0025***	0.0027***	0.0569	0.0376
	(0.0014)	(0.0013)	(0.0102)	(0.0103)	(0.0001)	(0.0001)	(0.0601)	(0.0527)
Firm Age (Log)		0.0299***		-0.2190***		-0.0020***		-0.5766***
		(0.0004)		(0.0024)		(0.0000)		(0.0166)
Assets (Log)		-0.0370***		-0.0945***		-0.0002***		0.5058***
		(0.0001)		(0.0004)		(0.0000)		(0.0014)
Industry and Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0508	0.2218	0.0087	0.0478	0.0042	0.0079	0.0875	0.3359
Observations	4,049,269	4,049,269	3,761,859	3,761,859	3,942,636	3,937,440	353,413	353,393

Notes: This table presents all results for the effects of *Tax Incentive*$_i$ on *Cash*$_{i,t}$, *Leverage*$_{i,t}$, *ROE*$_{i,t}$ and *Intangible Assets*$_{i,t}$ by estimating equation (7). Depending on the specifications, we also include (columns 2, 4, 6, and 8) and exclude (columns 1, 3, 5, and 7) *Firm Age (Log)*$_{i,t}$ and *Assets (Log)*$_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Bootstrap sampling and estimation: Baseline results

	Capex_{it}		ROA_{it}	
	(1)	(2)	(3)	(4)
Tax Incentive × Post 2014	0.0276***	0.0272***	0.0005***	0.0005***
	(0.0032)	(0.0030)	(0.0000)	(0.0000)
Firm Age (Log)		-0.7596***		-0.0108***
		(0.1091)		(0.0016)
Assets (Log)		-0.0348***		0.0002***
		(0.0002)		(0.0000)
Industry and Year FEs	Yes	Yes	Yes	Yes
Adjusted R-squared	-0.1095	-0.0007	-0.0981	-0.0920
Observations	2,972,061	2,972,061	3,963,579	3,959,472

Notes: This table presents all baseline results for the effects of $Tax\ Incentive_i$ on $Capex_{i,t}$, and $ROA_{i,t}$, where we estimate equation (7) and report bootstrapped standard errors. Depending on the specifications, we also include (columns 2 and 4) and exclude (columns 1 and 3) $Firm\ Age\ (Log)_{i,t}$ and $Assets\ (Log)_{i,t}$ as control variables. Standard errors are bootstrapped 50 times and presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Robustness Tests: Different Clusters for Standard Errors

	Capex_{it}				ROA_{it}			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax Incentive × Post 2014	0.0299***	0.0299***	0.0299**	0.0299***	0.0008***	0.0008***	0.0008***	0.0008***
	(0.0029)	(0.0047)	(0.0114)	(0.0091)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Firm Age (Log)	0.0933***	0.0933***	0.0933***	0.0933***	0.0000**	0.0000	0.0000	0.0000
	(0.0018)	(0.0029)	(0.0238)	(0.0232)	(0.0000)	(0.0001)	(0.0002)	(0.0002)
Assets (Log)	-0.0229***	-0.0229***	-0.0229***	-0.0229***	-0.0000***	-0.0000***	-0.0000**	-0.0000*
	(0.0002)	(0.0004)	(0.0034)	(0.0033)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Industry and Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Clusters	Yes	No	No	No	Yes	No	No	No
Firm and Year Clusters	No	Yes	No	Yes	No	Yes	No	No
Industry Clusters	No	No	Yes	No	No	No	Yes	No
Industry and Year Clusters	No	No	No	Yes	No	No	No	Yes
Adjusted R-squared	0.1769	0.1769	0.1769	0.1769	0.0059	0.0059	0.0059	0.0059
Observations	2,972,063	2,972,063	2,972,063	2,972,063	3,959,485	3,959,485	3,959,485	3,959,485

Notes: This table presents all baseline results for the effects of *Tax Incentive*$_i$ on *Capex*$_{i,t}$, and *ROA*$_{i,t}$, where we estimate equation (7) and report various types of clustering for standard errors. Depending on the specifications, we also include *Firm Age (Log)*$_{i,t}$ and *Assets (Log)*$_{i,t}$ as control variables in all specifications. Standard errors are clustered at the firm level (columns 1 and 2), at the firm and year levels (columns 2 and 6), at the industry level (columns 3 and 7), and at the industry and year (columns 4 and 8), and are presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Tax Incentives and Russian Sanctions: Average Treatment Effects

	(1) Capex	(2) ROA
Tax Incentive$_i$ × Post 2014$_t$	0.0808***	0.00069***
	(0.0196)	(0.00023)
Average Treated Group in 2013	0.341	0.0018
Observations	1,074,918	1,447,017

Notes: This table presents all baseline results for the effects of *Tax Incentive*$_i$ on $Capex_{i,t}$, and $ROA_{i,t}$ as outlined in Equation (9) by using the synthetic difference-in-difference approach (Arkhangelsky et al., 2021). Bootstrapped standard errors are in parentheses. p-values are based on large-sample approximations following the aforementioned study. Significance levels are indicated by: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 11: Placebo Tests: Randomizing the Tax Incentives

	Capex_{it}		ROA_{it}	
	(1)	(2)	(3)	(4)
Tax Incentive (Placebo) × Post 2014	0.0010	0.0015	0.0000	-0.0000
	(0.0012)	(0.0012)	(0.0000)	(0.0000)
Firm Age (Log)		0.0935***		0.0001***
		(0.0006)		(0.0000)
Assets (Log)		-0.0231***		-0.0000***
		(0.0001)		(0.0000)
Industry and Year FEs	Yes	Yes	Yes	Yes
Adjusted R-squared	0.1333	0.1774	0.0048	0.0054
Observations	2,972,061	2,972,061	3,963,579	3,959,472

Notes: This table presents all baseline results for the effects of *Tax Incentive*$_i$ on *Capex*$_{i,t}$, and *ROA*$_{i,t}$, where we estimate equation (7) with randomized tax incentive treatments. Depending on the specifications, we also include (columns 2 and 4) and exclude (columns 1 and 3) *Firm Age (Log)*$_{i,t}$ and *Assets (Log)*$_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 12: Tax incentives and firm outcomes with alternative sanction timing

	Capex_{it}		ROA_{it}	
	(1)	(2)	(3)	(4)
Tax Incentive 2012 × Post 2013	0.0025	-0.0026	<-0.0001	<-0.0001
	(0.0016)	(0.0016)	(0.0000)	(0.0000)
Firm Age (Log)		0.0662***		-0.0004***
		(0.0006)		(0.0000)
Assets (Log)		-0.0238***		-0.0000***
		(0.0001)		(0.0000)
Industry and Year FEs	Yes	Yes	Yes	Yes
Adjusted R-squared	0.1412	0.1827	0.0057	0.0069
Observations	2,608,784	2,608,784	3,878,479	3,875,643

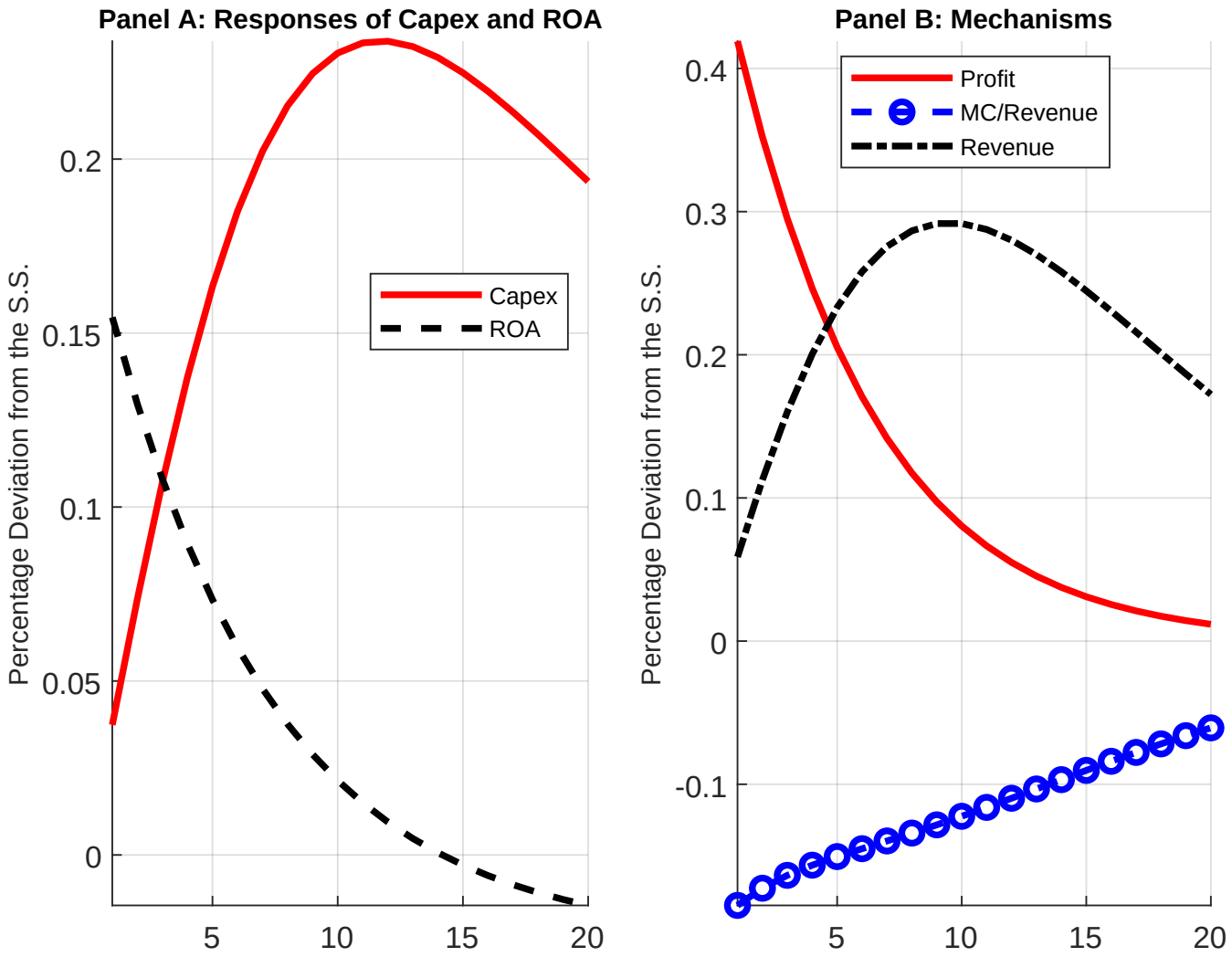
Notes: This table presents all baseline results for the effects of $Tax\ Incentive_i$ on $Capex_{i,t}$, and $ROA_{i,t}$, where we estimate equation (7) with alternative sanction and tax incentive timings. Depending on the specifications, we also include (columns 2 and 4) and exclude (columns 1 and 3) $Firm\ Age\ (Log)_{i,t}$ and $Assets\ (Log)_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: Unique Registration IDs

	Capex_{it}		ROA_{it}	
	(1)	(2)	(3)	(4)
Tax Incentive × Post 2014	0.0276***	0.0271***	0.0005***	0.0005***
	(0.0021)	(0.0020)	(0.0000)	(0.0000)
Firm Age (Log)		-0.7546***		-0.0108***
		(0.0751)		(0.0011)
Assets (Log)		-0.0348***		0.0002***
		(0.0001)		(0.0000)
Registration ID and Year FEs	Yes	Yes	Yes	Yes
Adjusted R-squared	0.7319	0.7582	0.2843	0.2899
Observations	2,959,686	2,959,686	3,958,679	3,954,539

Notes: This table presents all baseline results for the effects of $\textit{Tax Incentive}_i$ on $\textit{Capex}_{i,t}$, and $\textit{ROA}_{i,t}$ by estimating equation (7) where the cross-sectional units are aggregated to the tax registration IDs. Depending on the specifications, we also include (columns 2 and 4) and exclude (columns 1 and 3) $\textit{Firm Age (Log)}_{i,t}$ and $\textit{Assets (Log)}_{i,t}$ as control variables. Robust standard errors are presented in parentheses. Significance levels are indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

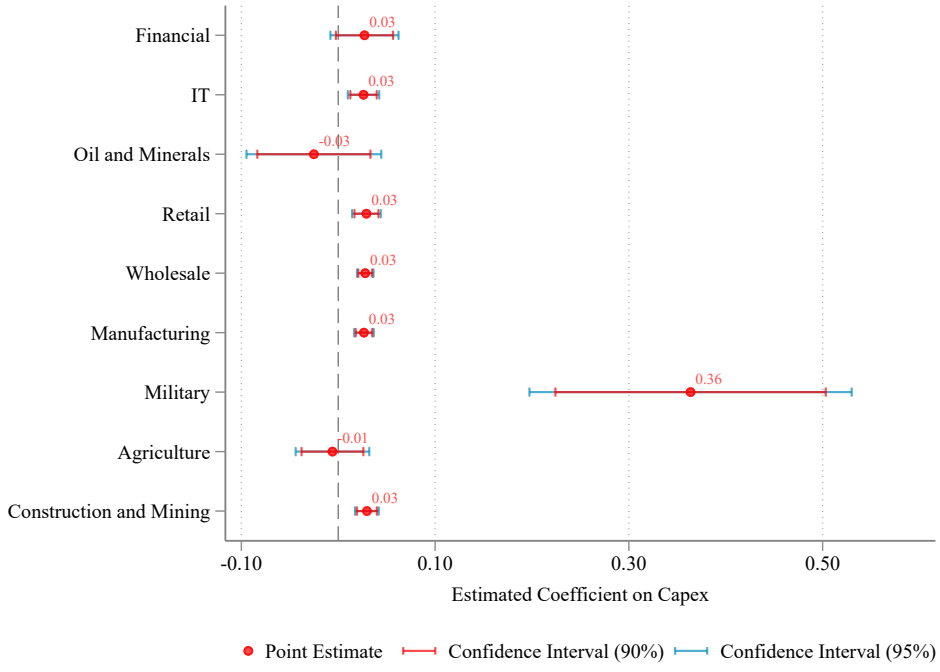
Figure 2: Stylized Responses to an Exogenous Increase in Tax Incentive τ_t



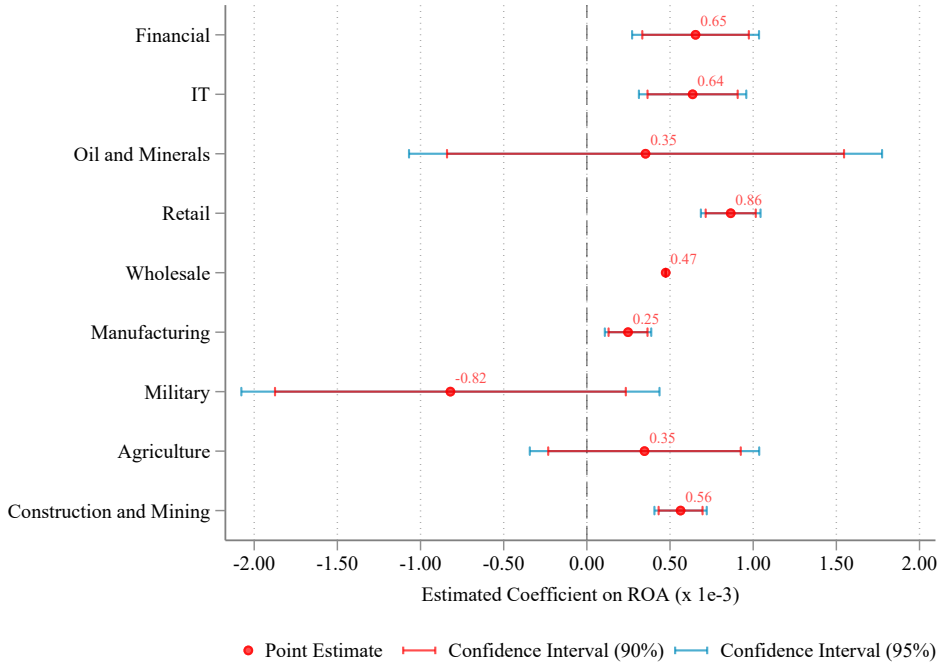
Note: This figure plots the impulse responses of selected variables to an unexpected one-percent shock to tax incentive τ_t. With the exception of the standard deviation of the tax incentive shock $\sigma^T = 0.01$ and its persistence $\rho^T = 0.9$, the rest of our stylized parameterization of the model follows Fernández-Villaverde (2010).

Figure 3: Heterogeneous Effects of Tax Incentives across Sectors

(a) Capital Expenditure



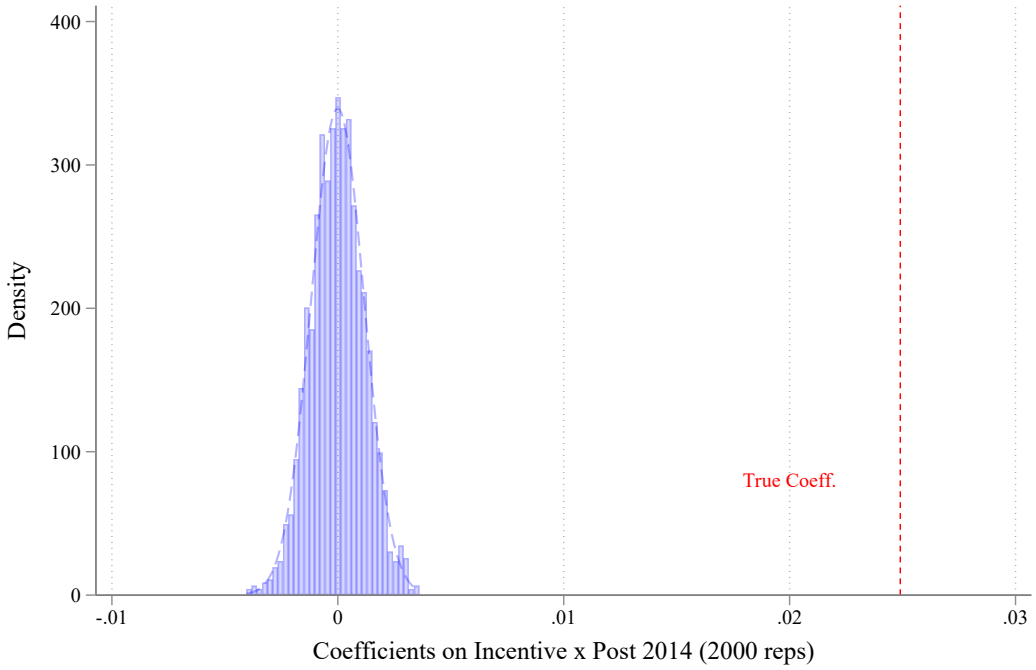
(b) ROA



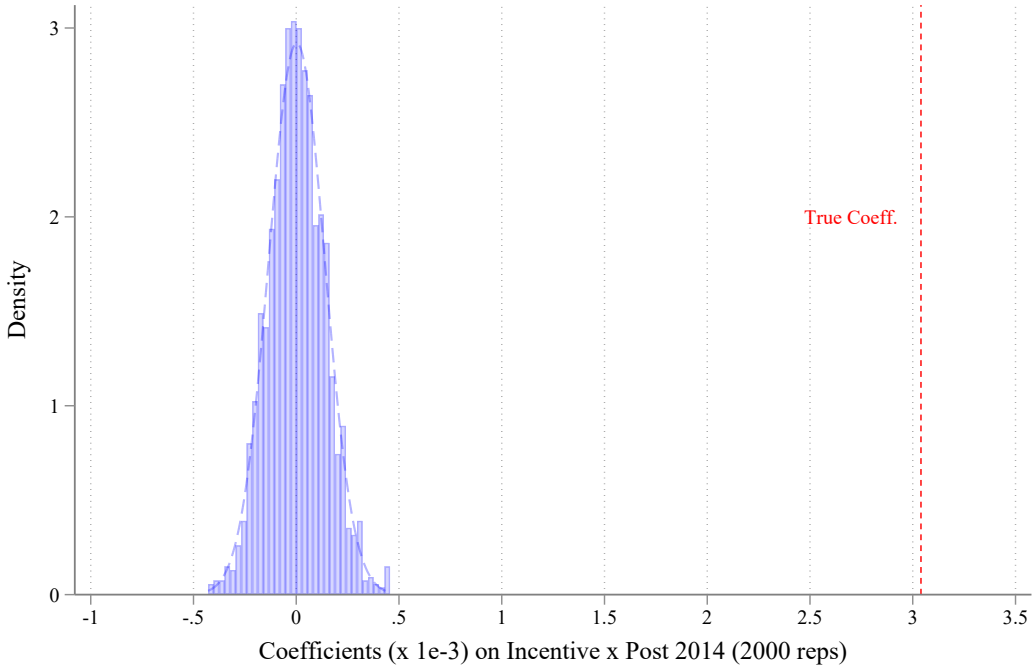
Note: This figure the estimated coefficient τ_1 on the interaction term Incentive$_i$ $\times$ Post 2014$_t$ by estimating Equation 7 for selected industries. We also include the control variables such as *Firm Age (Log)*$_{i,t}$, *Employees (Log)*$_{i,t}$, *Assets (Log)*$_{i,t}$ for all estimations. Robust standard errors are included in our estimations.

Figure 4: Placebo Tests: Randomizing the Tax Incentive

(a) Capital Expenditure



(b) ROA



Note: In this figure, we randomly assign the tax incentives to all firms in the sample and re-estimate Equation 7 using the randomized (placebo) incentive treatment (i.e., following columns 2 and 4 of Table 3). After repeating the exercise for 2,000 repetitions, we plot the distribution of the interaction term coefficients in Equation 7 along with the true coefficients estimated using the actual data on incentives. Panel (a) shows such distribution and the true estimate when the dependent variable is capital expenditure. Panel (b) shows such a distribution and the true estimate when the dependent variable is ROA.

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Accompanying Appendix to "Tax Incentives under Sanctions: Evidence from Russian Tax Authorities"

A The Model

In the spirit of Fernández-Villaverde and Rubio-Ramírez (2006), the remaining part of the model features a representative household that maximizes its well-being by choosing how much to consume and how much leisure to enjoy. This household faces budget limitations related to saving, holding money, and deciding how much to work. Its wage is disciplined by a decreasing demand for labor and sticky prices. A final goods sector combines a variety of intermediate goods produced by monopolistically competitive firms (as previously described in the main text). The central bank controls the short-term nominal interest rate through buying and selling government bonds. Even though, with the exception of the intermediate firm tax incentive problem described in the main text, the rest of the model follows from Fernández-Villaverde and Rubio-Ramírez (2006), we describe the rest of the model here for completeness.

A.1 Households

The economy is populated by a continuum of households, indexed by j, that maximize the following lifetime utility function

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta \left\{ \log(c_{jt} - h c_{jt-1}) + v \log\left(\frac{m_{jt}}{p_t}\right) - \psi \frac{l_{jt}^{1+\gamma}}{1+\gamma} \right\},$$

in which β is the subjective discount factor, h governs the households' habit persistence, and γ denotes the inverse of the Frisch labor supply elasticity. As is standard in the New-Keynesian literature, the household can trade on the full set of possible Arrow-Debreu securities. Household j maximizes its lifetime utility function, subject to the following budget constraint

$$\begin{aligned} c_{jt} + x_{jt} + \frac{m_{jt}}{p_t} + \frac{b_{jt}}{p_t} + \int q_{jt+1} a_{jt+1} d\omega_{jt+1,t} = \; & w_{jt} l_{jt} \quad + (r_t u_{jt} - \mu_t^{-1} a[u_{jt}]) k_{jt-1} \\ + \; & \frac{m_{jt-1}}{p_t} + R_{t-1} \frac{b_{jt}}{p_t} + a_{jt} + \mathbb{T}_t + \mathbb{F}_t, \end{aligned}$$

where w_{jt} is the real wage, r_t is the real rental rate of capital, and $\mu_t^{-1} a[u_{jt}])$ denotes the cost of capital. Here a_{jt+1} denotes the amount of securities that pays one unit of consumption when $\omega_{jt+1,t}$ is purchased by the household at the price of $q_{jt+1,t}$.The last two terms $\mathbb{T}_t$ and $\mathbb{F}_t$ denote a lump-sum transfer and the profits of the firms in the economy.

The law of motion for capital follows

$$k_{jt} = (1-\delta) k_{jt-1} + \mu_t \left(1 - S\left[\frac{x_{jt}}{x_{jt-1}}\right]\right) x_{jt},$$

where x_{jt} denotes capital investments and $S(.)$ is an adjustment cost function. The capital adjustment cost μ_t follows an AR(1) process of the following type:

$$\mu_t = \mu_{t-1}\exp(\Lambda_\mu + z_{\mu t}) \qquad \text{where} \qquad z_{\mu t} = \sigma_\mu \varepsilon_{\mu t} \qquad \text{and} \qquad \varepsilon_{\mu t} \overset{\text{iid}}{\sim} N(0,1)$$

A.2 Labor Aggregation

The labor used by the intermediate firms described in the main text is provided by a representative competitive firm that hires labor from each household j. The firm aggregates the differentiated labor supply from the households via the following CES aggregator $l_t^d = \left(\int_0^1 l_{jt}^{\frac{\eta-1}{\eta}}\right)^{\frac{\eta}{\eta-1}}$, where the elasticity of substitution η satisfies $0 \leq \eta < \infty$. The firm maximizes profits subject to the CES labor aggregation, taking individual firm wage w_{jt} and aggregate wage w_t as given. Specifically, they maximize

$$\max_{l_{jt}} w_t l_t^d - \int_0^1 w_{jt} l_{jt} dj,$$

Given that the firm competes in a perfectly competitive market, its zero-profit condition implies the following labor demand

$$l_{jt} = \left(\frac{w_{jt}}{w_t}\right)^{-\eta} l_t^d \qquad \forall \quad j$$

In dealing with the labor aggregation firm, the household is assumed to set their wages according to Calvo pricing. In particular, in each period, a fraction $1-\theta_w$ of the household can change their wages and the remaining households partially index their wage by past inflation.

A.3 The Final Good Producer

The final good producer engages in a perfectly competitive market and maximizes its profits

$$\max_{y_{it}} p_t y_t^d - \int_0^1 p_{it} y_{it} di, \qquad \text{subject to} \qquad y_t^d = \left(y_{it}^{\frac{\epsilon-1}{\epsilon}}\right)^{\frac{\epsilon}{\epsilon-1}}$$

A.4 Government and Monetary Policy

The government sets the nominal interest rates R_t following a Taylor rule and the transfers are such that the deficit equals to zero as follows

$$\frac{R_t}{R} = \left(\frac{R_{t-1}}{R}\right)^{\gamma_R} \left(\left(\frac{\Pi_t}{\Pi}\right)^{\gamma_\Pi} \left(\frac{\frac{y_t^d}{y_{t-1}^d}}{\Lambda_{y^d}}\right)^{\gamma_y}\right)^{1-\gamma_R} \tag{11}$$

and

$$\mathbb{T}_t = \frac{\int_0^1 m_{jt} dj - \int_0^1 m_{jt-1} dj}{p_t} + \frac{\int_0^1 b_{jt+1} dj - R_{t-1}\int_0^1 b_{jt} dj}{p_t},$$

where variable definitions follow directly from Fernández-Villaverde and Rubio-Ramírez (2006).

B Summary of tax incentives and our variables

In this section, we provide additional appendices, including definitions and sources of the variables used (Appendix A1), and a balance test of mean differences between the two groups (Appendix A2).

Table A1: Variable Definitions

Variables	Definitions	Sources
Tax Incentive	A dummy variable with a value of 'one' for the treated firms (i.e., firms received tax incentive), as defined in Section 4.1, and 'zero' for the control firms.	Authors' Computation
Capex	The ratio of capital expenditures to total assets	SPARK-Interfax
ROA	The ratio of income to total assets	SPARK-Interfax
Revenue (Log)	The natural logarithm of the revenue	SPARK-Interfax
Profit (Log)	The natural logarithm of the profit	SPARK-Interfax
Cash	The ratio of cash and cash equivalence to total assets	SPARK-Interfax
Leverage	The ratio of total debt to total assets	SPARK-Interfax
Labor Cost	The ratio of the labor costs to revenue	SPARK-Interfax
Intangible Assets (Log)	The natural logarithm of intangible assets	SPARK-Interfax
Firm Age (Log)	The natural logarithm of the number of months since the firm's establishment	SPARK-Interfax
Assets (Log)	The natural logarithm of total assets	SPARK-Interfax
Post 2014	A dummy variable with a value of 'one' for the period following 2014 (the Annexation of Crimea) and 'zero' for the years prior.	SPARK-Interfax

Table A2: Balance test: Difference-in-means between two groups

	Without Tax Incentive		With Tax Incentive		Pairwise t-test		
	Obs.	Mean	Obs.	Mean	Obs.	Mean Difference	Std. Error
Capex	2,785,127	0.3104	186,936	0.3363	2,972,063	-0.0259***	0.0007
ROA	3,665,583	0.0009	298,008	0.0011	3,963,591	-0.0002***	0.0000
Revenue (Log)	3,711,612	16.4727	297,494	15.4499	4,009,106	1.0228***	0.0050
Profit (Log)	2,289,467	15.1488	134,652	14.2215	2,424,119	0.9273***	0.0080
Labor Cost	856,418	0.2236	33,440	0.2624	889,858	-0.0388***	0.0016
Cash	3,717,706	0.1392	331,563	0.2132	4,049,269	-0.0740***	0.0004
Leverage	3,440,717	0.7215	321,142	0.9089	3,761,859	-0.1873***	0.0024
Intangible Assets (Log)	337,115	11.5635	16,298	11.5072	353,413	0.0563**	0.0248
Firm Age (Log)	4,124,072	5.5510	476,783	5.6512	4,600,855	-0.1003***	0.0004
Assets (Log)	4,011,095	16.1327	390,453	14.8966	4,401,548	1.2361***	0.0047

Notes: This table presents the mean differences in our variables of interest between the two groups: those with tax incentives and those without.